

Application No.: 10/065,380

Docket No.: JCLA8066

REMARKS**Present Status of Patent Application**

Claims 1-6, 8 and 16-18 remain pending of which claims 16 and 18 have been amended. For at least the following reasons, Applicants respectfully submit that claims 1-6, 8 and 16-18 are in proper condition for allowance. Reconsideration is respectfully requested.

Discussion of Objections:

1. *The Office Action objected to the disclosure because of the following informalities: paragraph [0031], line 2, change "144" to -114-. Appropriate correction is required.*

Applicants would like to thank the Examiner for pointing out the informalities, and accordingly amended the specification. After entry of the above amendments, it is believed that the above objections can be overcome. Reconsideration is respectfully requested.

Discussion of claim rejections

1. *The Office Action rejected claim 18 under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in a such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time of the application was filed, had possession of the claimed invention. Claim languages "having a first area define by the contour of the first capacitor electrode" and having a second area define by the contour of the second capacitor electrode" are not in the specification and not in the drawings.*

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In response thereto, Applicants have amended claim 18. After entry of the above amendments to claim 18, it is believed that the above rejections can be overcome. Reconsideration is respectfully requested.

2. The Office Action rejected claim 8 under 35 U.S.C. 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In rejecting the above claim, the Office Action stated that the term "if" is an uncertain term in a device claim language.

In response thereto, Applicants have amended claim 8, and after entry of these amendments to claim 8, it is believed that the above rejection can be overcome. Reconsideration is respectfully requested.

3. The Office Action rejected claims 1-6, 8 and 17 under 35 U.S.C. 102(e) as being anticipated by Kawahata et al. (US-6,356,318, hereinafter Kawahata).

Applicants respectfully disagree and traverse the above rejections as follows. It is well established that rejections under 35 U.S.C. 102 requires that each and every elements of a claim must be disclosed exactly by a single reference. Independent claims 1, 6 and 17 are allowable for at least the reason that substantially Kawahata fails to teach, suggest or disclose every features of

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the claimed invention. More specifically Kawahata fail to teach, suggest or disclose a unit cell in a liquid crystal display comprising:

“a second capacitor electrode on the capacitor dielectric layer, wherein the second capacitor electrode has a surface area smaller than the first capacitor electrode, to prevent overlapping with edges of the first capacitor electrode, as required by claim 1; and

a second capacitor electrode on the capacitor dielectric layer, wherein the edges of the second capacitor electrode are bounded within the edges of the first capacitor electrode, as required by claim 6; and

a second capacitor electrode disposed substantially over the first capacitor electrode electrically connected to a pixel electrode, wherein an area of the second capacitor electrode normally projected on the plane of the first capacitor electrode is substantially bounded within an area of the first capacitor electrode so as to prevent electrical short between the second capacitor electrode and the signal line, as required by claim 17.”

The advantage of the above structural features of claims 1, 6 and 17 is that at least electric short between the second capacitor electrode and the signal line can be effectively prevented. Thus, the reliability and the display performance of the LCD can be effectively improved.

According to Applicants, when the edges of the second capacitor electrode overlap with the edges of the first capacitor electrode, the residual conductive material (115) may undesirably connect the second capacitor electrode and the signal line, and therefore the capacitor may malfunction. In order to resolve the above problems, Applicants proposed that the surface area

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of the second capacitor electrode should be smaller than that of the first capacitor electrode so that the edges of the second capacitor electrode do not overlap with the edges of the first capacitor electrode and that the edges of the second capacitor electrode can be bounded within the edges of the first capacitor electrode. In doing so, during the fabrication of the second capacitor electrode, some residual conductive material (115) is prevented from contacting the second capacitor electrode which would otherwise undesirably connect the second capacitor electrode with the signal line. Therefore the electric short between the second capacitor electrode and the signal line can be effectively prevented. Thus both the reliability of the product and the yield can be effectively promoted.

Instead, Kawahata substantially recognized that the problems when the gate insulating film 43 of the TFT 38 serves as an insulating film for the storage capacitor Cs. However, the use of a single film formed by a single process as both the gate insulating film 43 and the insulating film for the storage capacitor Cs is favorable in view of simplifying a liquid crystal display fabricating process but a voltage to be applied to the storage capacitor Cs is in the range of 1/4 to 1/2 of a voltage to be applied to the TFT 38. Therefore, a thickness of the insulating film for the storage capacitor Cs having a sufficient dielectric strength may be smaller than that of the gate insulating film 43 of the TFT 38. Thus, the thickness of the gate insulating film 43 of the TFT 38 is excessively great for the insulating film for the storage capacitor Cs. In order to resolve the above problems, Kawahata substantially teaches an active-matrix liquid crystal display comprising a gate insulating film 8 of a thickness in the range of 3000 to 5000 .ANG. covering

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the gate lines 7 and 7' and the gate electrodes 7a. Next, openings 9 are formed in part of the gate insulating film 8 overlying the gate lines 7' in regions corresponding to storage capacitors Cs to form the storage capacitors Cs therein. An insulating film 10 for forming the storage capacitors Cs is formed on the gate insulating film 8. Thus, the insulating film 10 with a thickness smaller than that of the gate insulating film 8 can be formed. The insulating film 10 is formed in a thickness great enough to secure a dielectric strength necessary for the storage capacitors Cs. Each storage capacitor Cs has a lower electrode and an upper electrode 15. The gate line 7' serves as the lower electrode of each storage capacitor Cs. The insulating film 10 is sandwiched between the gate line 7', i.e., the lower electrode, and the upper electrode 15. The upper electrode 15 is formed only in a flat region of the insulating film 10 and hence dielectric breakdown at steps in the insulating film 10 does not occur easily. Therefore, the insulating film 10 may be thin and hence the storage capacitor Cs has a large capacitance per unit area.

Accordingly, Applicants respectfully submit that Kawahata recognized the problems related to the use of the thick insulating layer 43 for both TFT (38) and the storage capacitor Cs. In order to resolve the above problems, Kawahata substantially teaches a method of removing a portion of the insulating layer 43 on the lower capacitor electrode 7' and forming a thinner insulating layer 10 in order to effectively increase the capacitance of the capacitor. However, Kawahata substantially fails to teach the problems related to residual conductive materials which would be generated during the patterning operation of channel region 104a made of amorphous silicon, and that when the edges of the upper capacitor electrode overlaps with the lower

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capacitor electrode, then the residual conductive material would adhere to the edges of the upper capacitor electrode which would otherwise make undesirable connection with the neighboring signal or source lines causing malfunction of the LCD or point defects adversely affecting the performance of the LCD. In fact, Kawahata fails to teach, suggest or disclose that some residual conductive materials generated during the fabrication of the capacitor would cause problems. Also, Kawahata substantially fails to even mention having the edges of the upper capacitor electrode bounded within the lower capacitor electrode, much less teaching on the advantages of having the edges of the upper capacitor electrode bounded within the edges of the lower capacitor electrode. Accordingly, Applicants respectfully submit that Kawahata cannot possibly anticipate the claimed invention in this regard.

For at least the forgoing reason, claims 1-6, 8 and 17 patentably distinguish over Kawahata. Reconsideration and withdrawal of these rejections is respectfully requested.

3. The Office Action rejected claim 16 under 35 U.S.C. 103(a) as being unpatentable over the Applicants' Admitted Prior Art (AAPA) and Kawahata.

Applicants respectfully disagree and submit that claim 16 has been amended to specify "*a first capacitor electrode, a capacitor dielectric layer and a second capacitor electrode together form the storage capacitor, and an area of the second capacitor electrode is smaller than an area of the first capacitor electrode so that edges of the second electrode do not overlap with edges of*

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the first capacitor electrode." The advantage of this structure is that electric short between the second capacitor electrode and the signal line can be effectively prevented.

Even though the Office Action relied upon AAPA to disclose a LCD device comprising a plurality of scan lines, a plurality of signal lines and a plurality of pixels each including a liquid crystal cell having a pixel electrode connected to a storage capacitor and a switching element connected between the liquid crystal cell and one of the signal lines including a capacitor, still AAPA cannot cure the specific deficiencies of Kawahata, in that Kawahata substantially fails to even mention an area of the second capacitor electrode is smaller than an area of the first capacitor electrode so that edges of the second electrode do not overlap with edges of the first capacitor electrode, as substantially discussed under section 2 above. For at least the foregoing reasons, no combination of AAPA and Kawahaka can meet claim 16 and therefore should be allowed. Reconsideration is respectfully requested.

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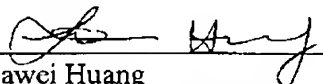
CONCLUSION

For at least the foregoing reasons, it is believed that all pending claims 1-6, 8 and 16-18 are in proper condition for allowance. If the Examiner believes that a conference would be of value in expediting the prosecution of this application, he is cordially invited to telephone the undersigned counsel to arrange for such a conference.

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Respectfully submitted,
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